

Pontics and the Edentulous Ridge: Use of the Ovate Pontic

Esthetic Pontic Design and the Edentulous Ridge (Requirements)

1. Appearance of the replacement: “emerges” from the edentulous ridge
2. Biologic: cleansability and tissue contact area
3. Mechanical: rigidity resists deformation of FPD / fracture of porcelain; strength of connectors

Oral Hygiene Requirements

1. Convex smooth surface of pontic
2. Adequate gingival embrasures
3. Patient education and hygiene aids
(floss threader; Super-floss; gauze; Proxy-brush)

Tissue Contact of Pontic

1. Area of contact: small and convex
2. No space between pontic and soft tissue on facial
3. Contact on attached keratinized gingiva only
4. No pressure on ridge

Ovate Pontic Design

1. Blunt / rounded apex set into a concavity in the ridge
2. Best used with a broad flat (rounded) ridge
3. Concavity is formed by:
 - a) Surgical creation of concavity in soft tissue
Tissue augmentation may be necessary (becomes **more complex**)
 - b) Immediate provisional restoration after extraction - matrix for tissue healing

Pre-Treatment Assessment

1. Examination of the residual edentulous ridge contour.

Does it need surgical modification or can gingival architecture preservation be accomplished after extraction?

2. Alveolar Ridge Shape and Resorption

Alveolar resorption and remodeling reshape the ridge after extraction (most in 1 year)

Lateral resorption → narrow ridge; vertical resorption → ridge height defect

Greater resorption and remodeling with trauma or periodontal disease

3. Residual Ridge Deformities - Siebert, JS (*Compend Contin Educ Dent* 4:437, 1983)

Class I: Faciolingual (32%); Class II: Ridge height (3%); Class III: Height and width (56%)

4. Esthetic Evaluation (especially prior to tooth removal if possible)

Smile line with extent of gingival display, gingival margin positions, length of papillae

Malpositioned or rotated teeth - adverse effect on adjacent alveolar architecture

Planning will uncover need for adjunctive treatment, eg orthodontics to provide most esthetic prosthodontic results.

5. Periodontal Evaluation - comprehensive / prior to tooth removal

Periodontal Biotype - helps predict hard- and soft-tissue healing following surgical procedures, eg ridge resorption and loss of interdental papilla. (“Black Triangles”)

- **Thick, flat periodontium** - short, wide tooth forms; short / flat interproximal papilla; thick fibrotic gingiva resistant to recession; wide zones of attached keratinized tissues; thick underlying alveolar bone resistant to resorption (predictable hard and soft tissue contour after healing).
- **Thin, scalloped periodontium** - long, narrow tooth forms; long, pointy interproximal papilla; thin, friable gingiva; minimal amounts of attached keratinized tissues; thin underlying alveolar bone, frequently dehisced or fenestrated (more prone to unpredictable tissue recession and alveolar resorption).
- Patients frequently present with a **moderate biotype**; deceptive and should consider protocol modifications as per thin, scalloped biotype.

If the tooth has poor gingival esthetics, some form of ridge augmentation will be necessary following extraction.

6. Extraction Defect Assessment

Following extraction, the extent of alveolar bone destruction relates to the extent of resorption following healing. When hard- and soft-tissue architecture is moderately to severely compromised, site preservation often in conjunction with site development procedures is commonly necessary to provide an esthetic outcome.

Especially important are underlying bone levels facially and interproximally.

Socket preservation with hard tissue graft (with expected implant placement).

Grafting at a subsequent date

Gingivoplasty of the Edentulous Ridge Tissue

If adequate contour as well as thickness of healthy connective tissue, the tissue can be contoured to create the recipient bed for the ovate pontic with various techniques (rotary curettage, electrosurgery, laser).

Surgical Correction of Deficient Pontic Areas (Site development)

Various surgical techniques (soft-tissue grafts) have been devised for restoring the contour of edentulous ridges that have resorption defects prior to adaptation with pontics.

- Preoperatively, a provisional RPD or pontic on a provisional FOD is hollowed out to act as a guide for ridge augmentation (from trial wax-up). This conveys guidelines to the surgeon to have enough soft tissue bulk so that an ovate pontic can be formed to mimic the emergence profile of the natural tooth, and to create the illusion of papillae in the final restoration.
- Patient management considerations include weekly or biweekly follow-up, and the provisional restoration worn after initial healing of graft can place no pressure on the healing tissues.
**This is a very unesthetic restoration, and the healing from grafts is prolonged.

Maintenance of the Interdental Papilla and Prosthesis-Guided Tissue Healing

Following extraction, development and maintenance of esthetic soft-tissue architecture is essential, and it prevents having to re-create the contour surgically if it is lost.

The presence of adjacent tooth attachment and the size of the gingival embrasure formed by contact of these teeth is responsible for the presence and height of the papilla.

When the contact is within 5 mm of the underlying osseous scallop, the papilla fills the embrasure with a 5 mm height of tissue.

When a tooth is extracted and a confined embrasure no longer exists, the interproximal papilla recedes to the same 3 mm level above bone as exists facially and the gingival scallop flattens to match the underlying osseous architecture.

(Tarnow, Magner, Fletcher. *The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla*. J Periodontol 1992; 63(12):995-996.)

- Critical to the preservation of this height of tissue following extraction is control of the gingival embrasure form and maintenance of the adjacent gingival attachments at the time of extraction.

Ovate pontic designs with fixed and/or removable interim prostheses or resin-bonded pontic to adjacent teeth. (Custom healing abutments for immediate implant placement)

Ovate pontics apply maintenance pressure on the gingival margin and interproximal papillae minimizing the tissue collapse following extraction.

References:

Shillingburg, HT, et al. Fundamentals of Fixed Prosthodontics, Chapter 26.

Spear, FM *Maintenance of the Interdental Papilla Following anterior Tooth Removal*. Pract Periodont Aesthet Dent 1999;11(1):21-28.

Dylina JF. *Contour determination for ovate pontics*. J Prosthet Dent 1999;82:136-42.

Zitzmann, Marinello, Berglundh. *The ovate pontic design: A histologic observation in humans*. J Prosthet Dent 2002;88:375-380.

Protocol for Use of an Immediate Provisional FPD

Smooth, convex, and highly polished surface of restoration is critical.

Shape of extension into the socket for achievement of optimal results:

- Pontic extends 2.5 mm apical to the facial free gingival margin upon extraction to prevent the facial tissue from collapsing during initial healing.
- On the facial surface, the pontic should extend in a straight line from the facial cervical 1/3 of the tooth; the interproximal contour must match that of the previously extracted tooth and the papilla must be supported through the entire faciolingual width of the papilla and the is extended palatally past the contact point and then beveled coronally to meet the palatal gingival margin (no gap for debris).
- Only slight lateral pressure should be exerted on the existing interproximal papillae; room for coronal enlargement of the papilla to accommodate for inflammation.

This pontic depth is maintained for 4 weeks following extraction.

Flossing under pontic is difficult, but patient instructions are to brush and floss adjacent teeth and floss under pontic when it becomes possible.

Vigorous rinsing or irrigation under pontic is desirable

After 4-week healing period, the pontic is removed and depth adjusted (and polished) to extend about 1.5 mm below the tissue; re-cemented (temp); flossing should be performed more easily.

Healing period between extraction and final impressions for definitive restoration.

Dependent on the amount of tissue change that occurs - highly variable and dependent on several factors (eg periodontal biotype).

Some sources cite 3 months, but in the highly esthetic zone 6 months may be prudent.

Techniques for Fabrication of Provisional Restorations

I. Indirect Technique (Laboratory fabricated FPD)

1. Impressions used to fabricate a diagnostic wax-up and vacuum-formed matrix.
2. The abutment teeth are prepared and an impression is made (VPS) and poured in stone.
3. On the cast - the gingival outline is marked with pencil on tooth to be extracted. The tooth is ground down on the cast as per an edentulous ridge but without disrupting the pencil line. The stone cast is further ground with an acrylic bur to ideal pontic profile and depth.
4. Separating medium is applied to the cast; the matrix is filled with provisional material and seated fully onto the cast, and allowed to polymerize. The restoration is removed and polished.
5. The tooth is subsequently extracted and a resorbable hemostatic material can be placed in the site (or socket grafting, etc).
6. There will be some blanching of the tissue under pressure when the provisional restoration is seated. Temporary cement **without eugenol** (sparingly) so that complete removal can be easily accomplished.

*This technique works especially well if the teeth are prepared at an appointment (before extraction); an impression is made (VPS) and poured in stone; then individual provisional crowns are made and cemented. The cast can be sent to the lab for fabrication of the provisional restoration and returned to the dentist. At the time of extraction, the individual provisional crowns are removed and the provisional FPD is ready for immediate try-in and cementation. This requires two appointments, but the process runs more smoothly.

II. Indirect-Direct Technique (Laboratory fabricated provisional FPD)

1. Diagnostic casts sent to lab to fabricate a diagnostic wax-up and matrix for provisional.
2. In the lab - the abutment teeth are minimally prepared on the cast, and the socket is prepared as above. The matrix is used to fabricate an indirect provisional restoration on this cast and returned to the dentist.
3. The abutment teeth are prepared. The tooth is extracted; then the retainers of the provisional are re-lined intraorally. Since the pontic and external contours of the provisional are already in final form and polished, there is less technical problem / tissue trauma than with the direct technique.

This technique is still **challenging - trying to get the teeth prepared and provisional adequately seated; as well as the relining after the extraction procedure is very difficult due to unforeseen difficulties.

III. Provisional RPD

There is a greater risk of adversely affecting the tissue healing with an RPD due to the inherent ability of movement, or pressure on the lingual gingival margin.

1. An accurate pre-operative cast is made; the tooth is removed from the cast while preserving the surrounding gingival architecture (as before). An ovate concavity of the proper depth and profile is created in the stone, featuring a deeper facial than lingual extension.
2. A denture tooth with appropriate mold and shade is prepared to fit within the prepared ovate concavity.
3. The working cast is lubricated and auto-polymerizing resin is mixed and flowed into the concavity. The denture tooth is retrofitted into the concavity, fusing with the acrylic resin so that it becomes the pontic with the prescribed contour.
4. The pontic is polished and secured into the concavity in the working cast. Wrought wire clasps are placed prior to waxing the denture base. The pattern is invested and processed with heat-polymerizing acrylic resin.
5. After extraction, the RPD is inserted to provide immediate support and maintenance of the gingival architecture but avoid excessive compression of the extraction defect or tissues.
6. Maintenance: The RPD is removed for oral hygiene twice daily and reinserted within 5 minutes to prevent tissue collapse. The patient is advised against functioning or activities on the surgical site and a soft diet is recommended for the duration of the healing phase.